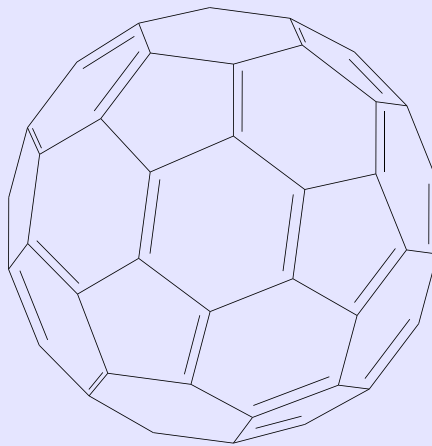
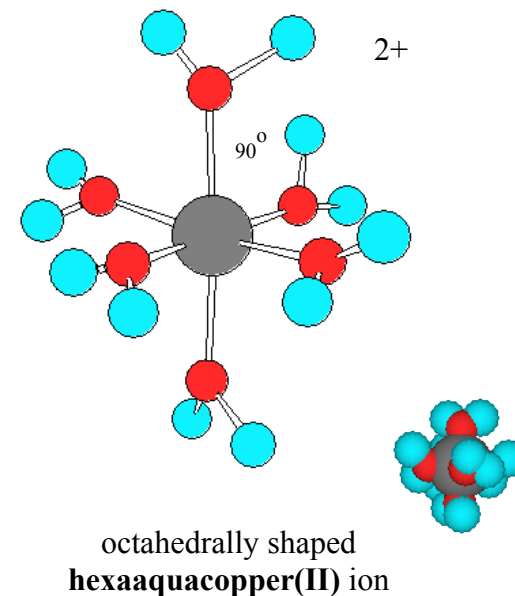
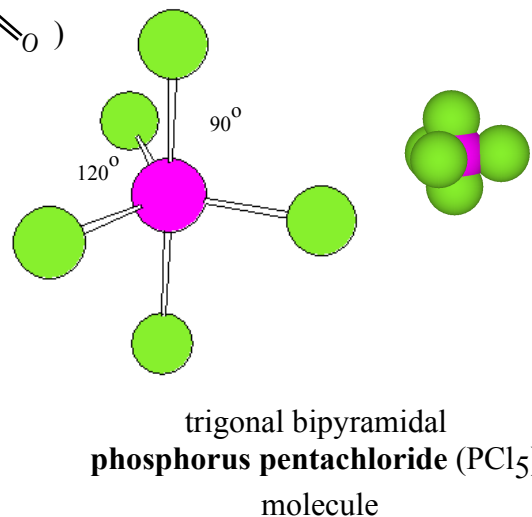
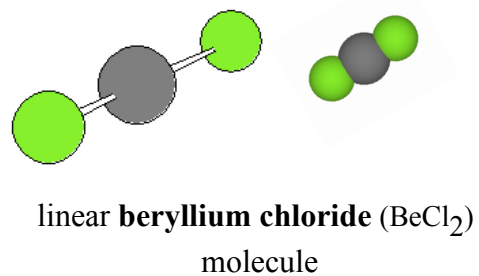
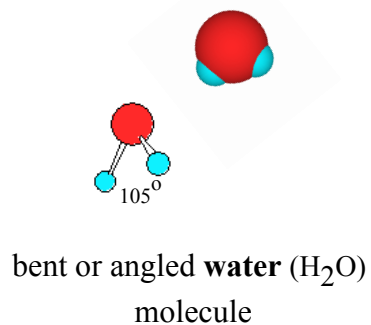
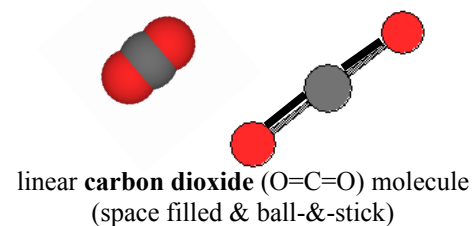
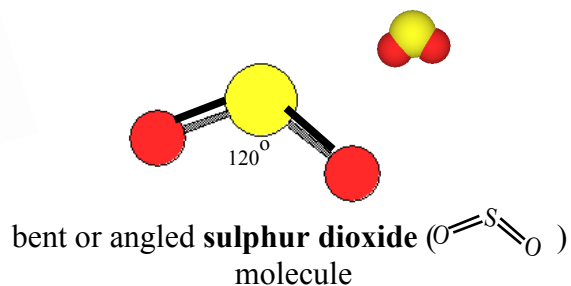
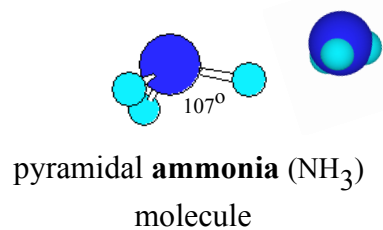
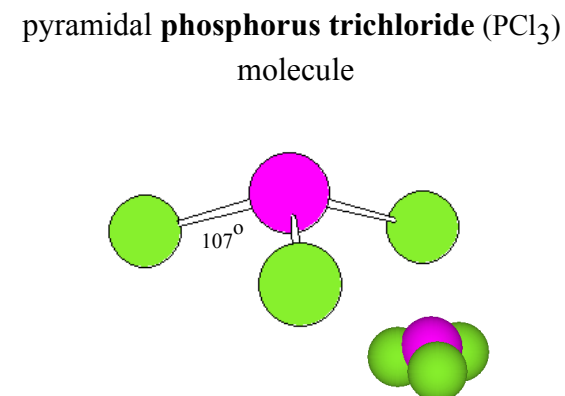
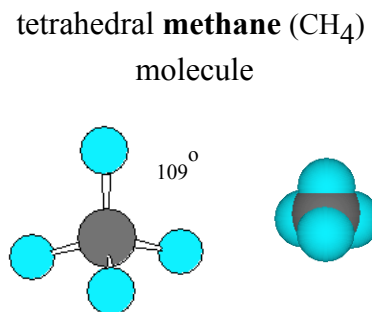
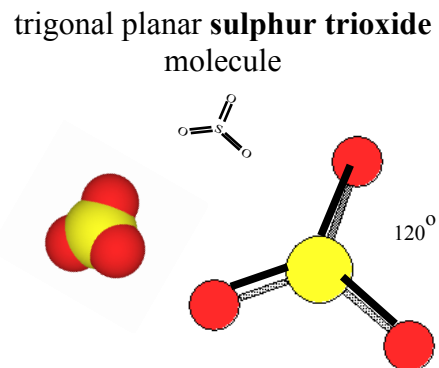
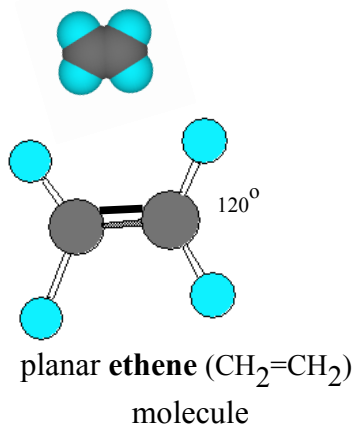


# Structures



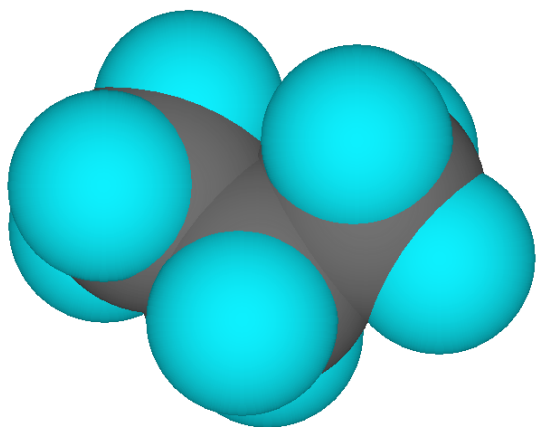
buckyball

# Molecular Shapes

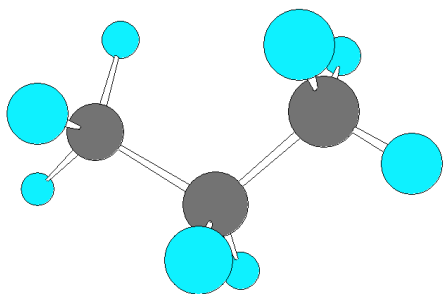


# Molecular Shapes

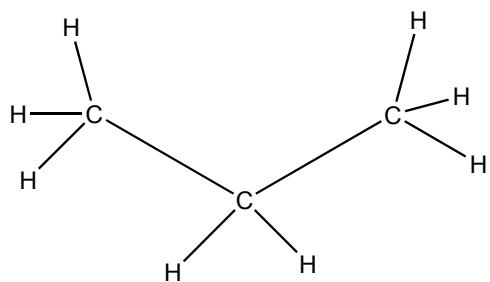
Propane



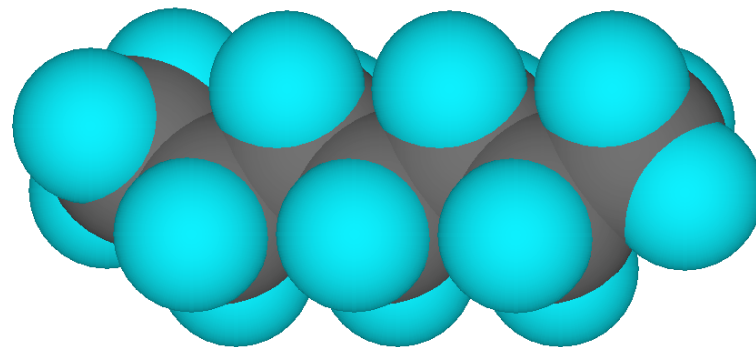
space filling



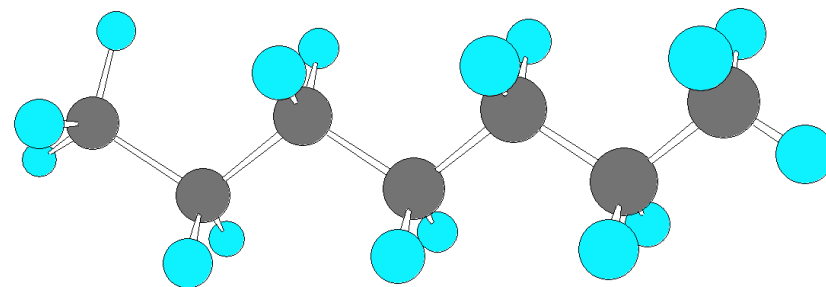
ball-&-stick



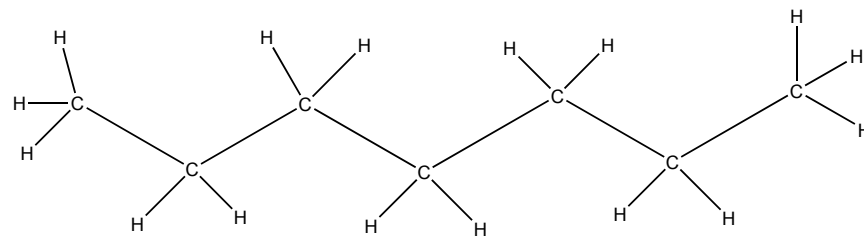
Heptane



space filling

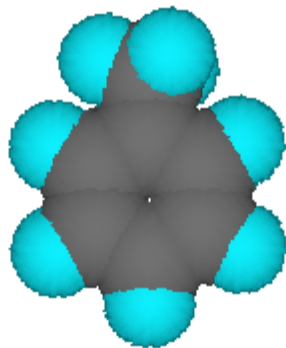


ball-&-stick

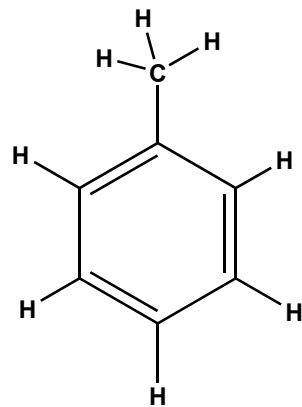


# Molecular Shapes

**methylbenzene**

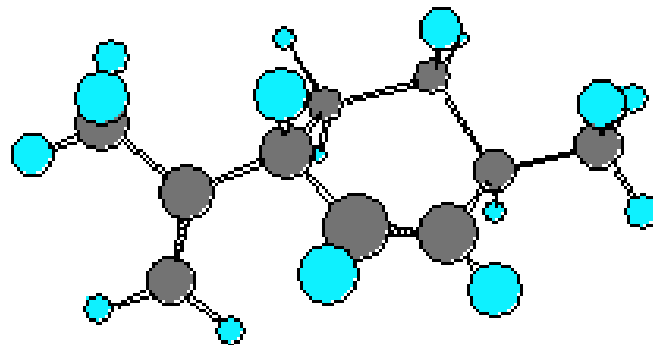


space filling

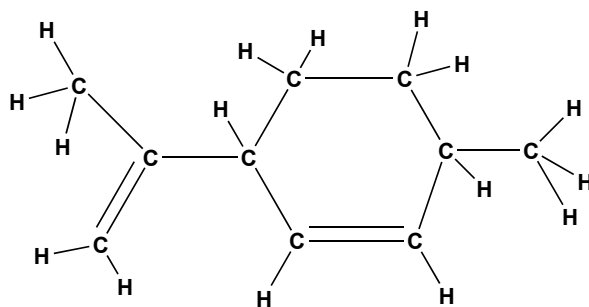


**limonene**

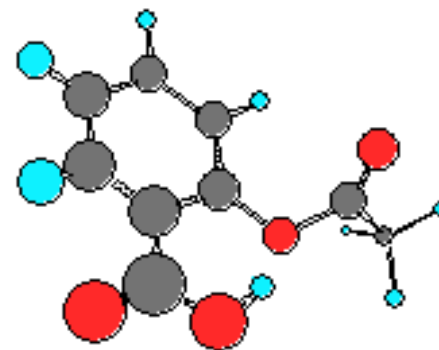
( in orange peel oil)



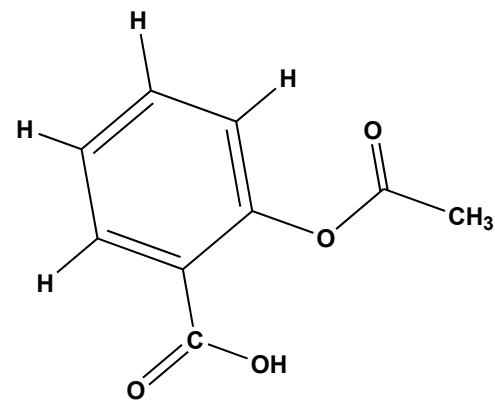
ball-&-stick



**aspirin (2-acetoxybenzenecarboxylic acid)**



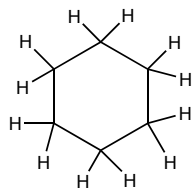
ball-&-stick



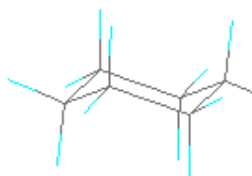


# Molecular Shapes

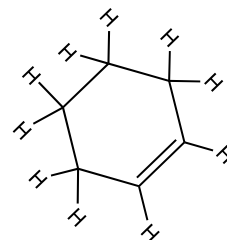
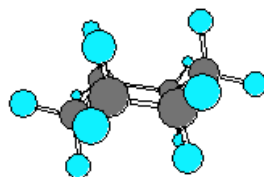
**cyclohexane**



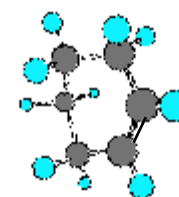
simple planar representation



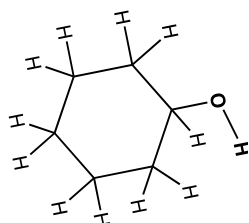
more realistic *chair* shape  
(tetrahedral at the carbon atoms)



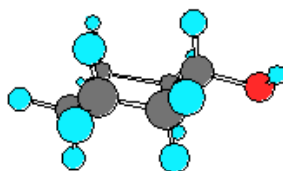
**cyclohexene**



**cyclohexanol**

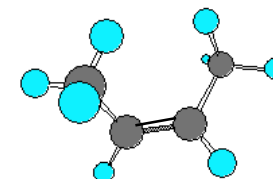
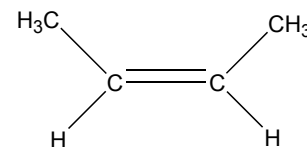


simple planar representation

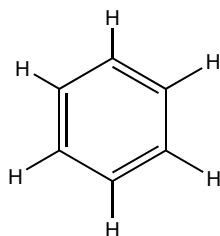


more realistic *chair* shape  
(tetrahedral at the carbon atoms)

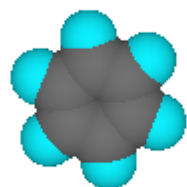
**cis but-2-ene**



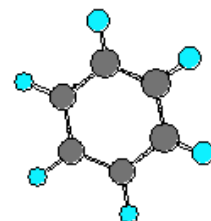
**benzene**



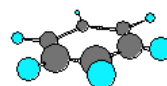
simple triene representation



space filling



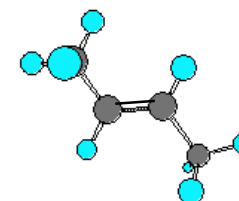
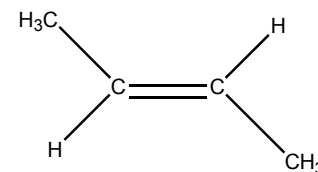
top view



end-on or side view

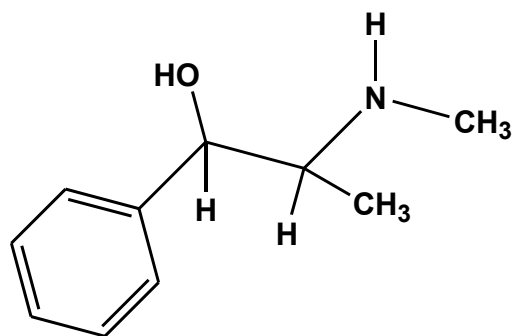
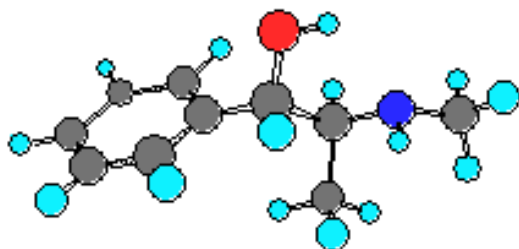
**planar structure**

**trans but-2-ene**



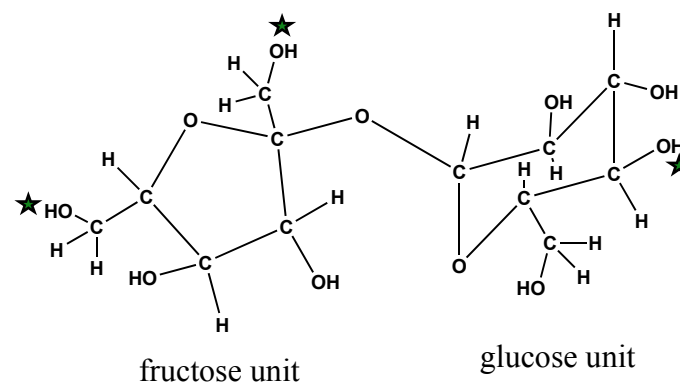
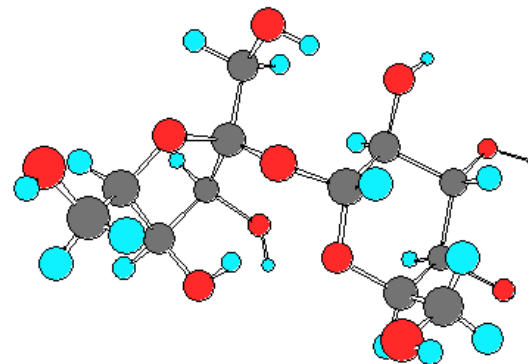
# Molecular Shapes

ephedrine

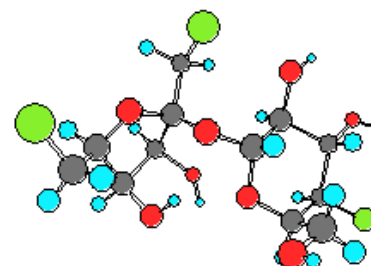


This substance is used in medicine as a stimulant and decongestant. It was first isolated from the plant *Ephedra distachya* by the Japanese chemist, N. Nagai, in 1885. Today it is synthesised from benzenecarbaldehyde. The laevorotatory (1R,2S) form being the most useful.

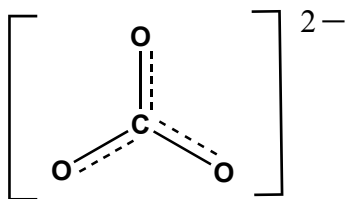
sucrose



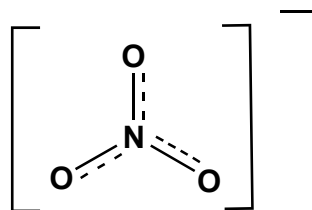
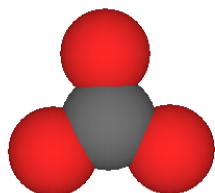
In the artificial sweetener, **sucralose**, the asterisked hydroxyl groups are replaced by chlorine atoms. This sweetener is 600 times sweeter than sucrose, twice as sweet as saccharin and three times sweeter than aspartame.



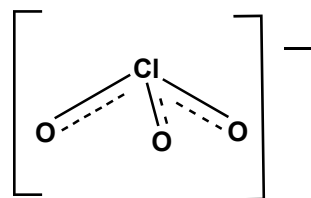
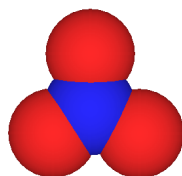
## Anion Shapes



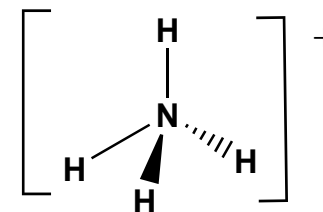
planar triangular **carbonate** ion



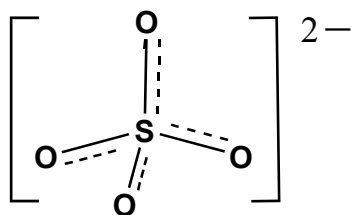
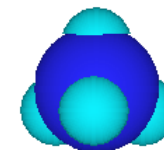
planar triangular **nitrate** ion



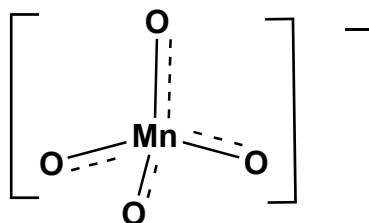
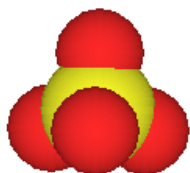
triangular pyramid **chlorate(V)** ion



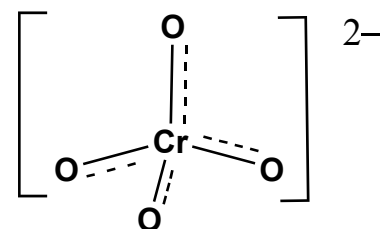
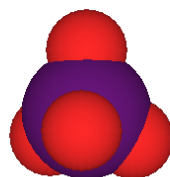
tetrahedral **ammonium** ion



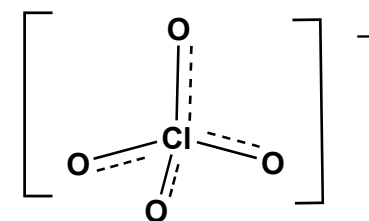
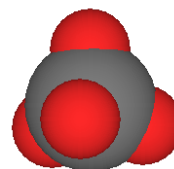
tetrahedral **sulphate** ion



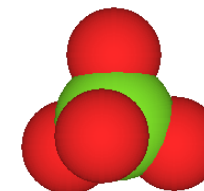
tetrahedral **manganate(VII)** ion



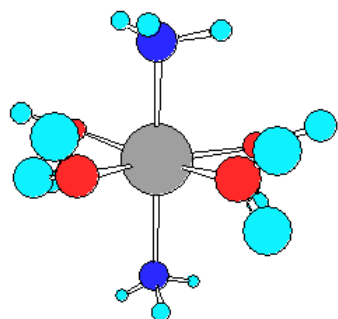
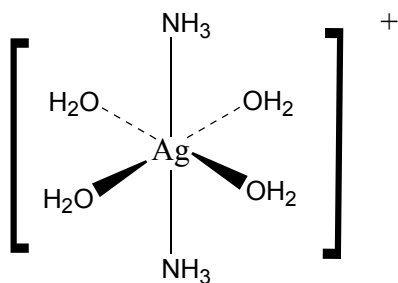
tetrahedral **chromate(VI)** ion



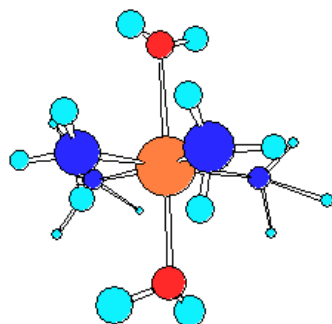
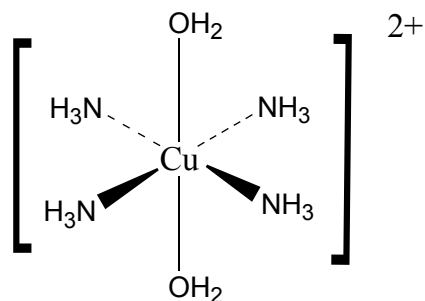
tetrahedral **chlorate(VII)** ion



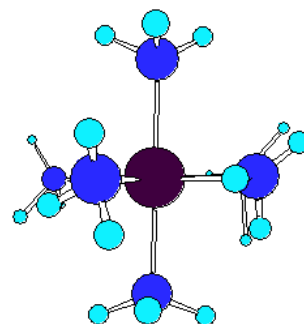
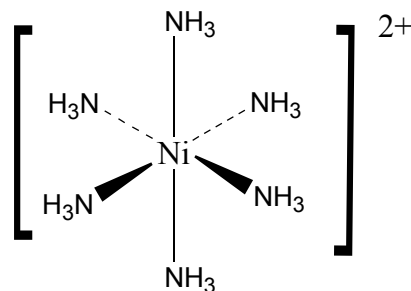
## Complex Cations



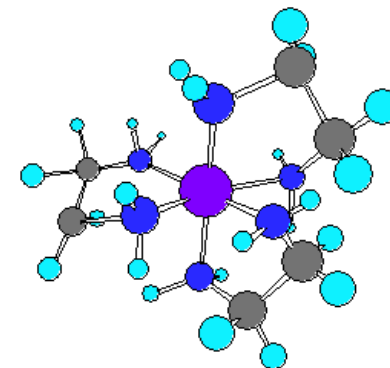
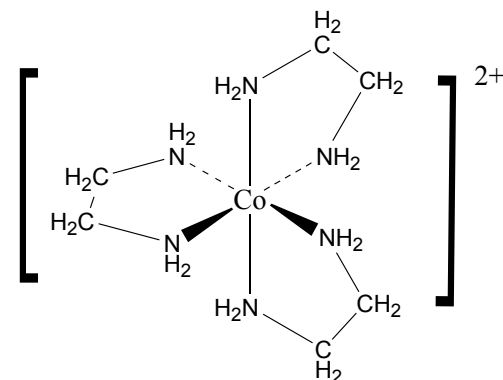
**diamminetetraaqua-silver(I) ion**  
(colourless)



**tetraamminediaqua-copper(II) ion**  
(dark blue)

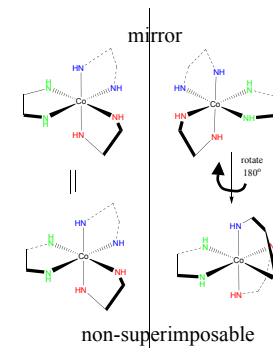


**hexaammine-nickel(II) ion**  
(pale lavender blue)

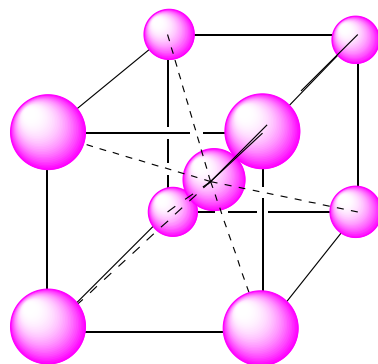


**tris(ethane-1,2-diamine)-cobalt(II) ion**  
(blue)

This complex is interesting because it exhibits optical isomerism. It is a chiral structure and is non-superimposable on its mirror image. The two enantiomers rotate plane polarised light to the same extent but in opposite directions.



# Structures of some solid Elements & Compounds



**Body centred cubic**

Elements and compounds having this **type** of structure:

eg,

Group 1 elements

Barium

Vanadium

Chromium

Tungsten

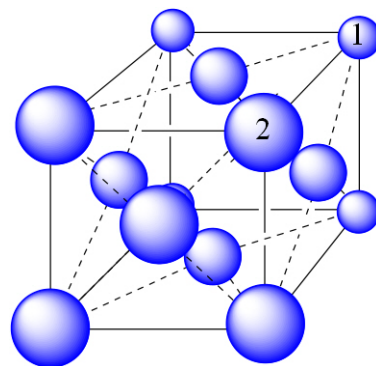
Niobium

Solid helium

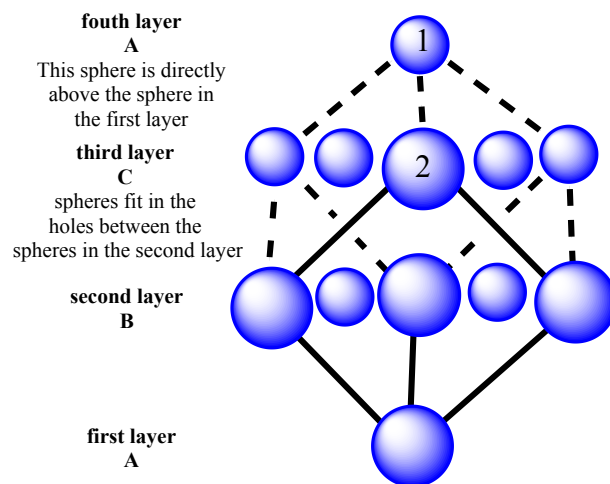
Tungsten

Caesium chloride (although not *strictly* body centred cubic since the atom at the centre of the cube is different to those at the corners)

## Close packed or face centred cubic



rotate cube 90°  
to the left & tilt  
forward a little



Elements and compounds having this **type** of structure:

eg,

Strontium

Copper

Platinum

Silver

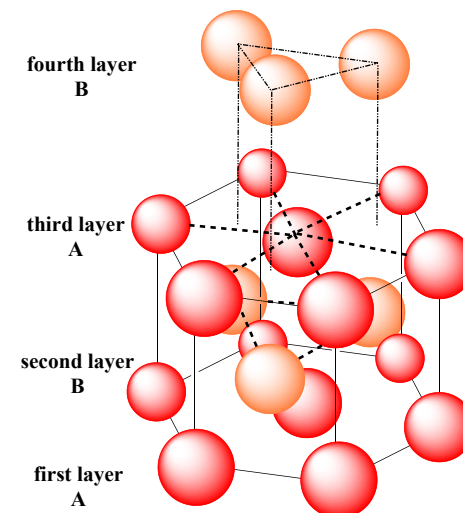
Solid neon

Iodine (I<sub>2</sub>)

Sodium chloride

Zinc sulphide

Strontium oxide



**Hexagonal close packed**

Elements and compounds having this **type** of structure:

eg,

Beryllium

Magnesium

Zinc

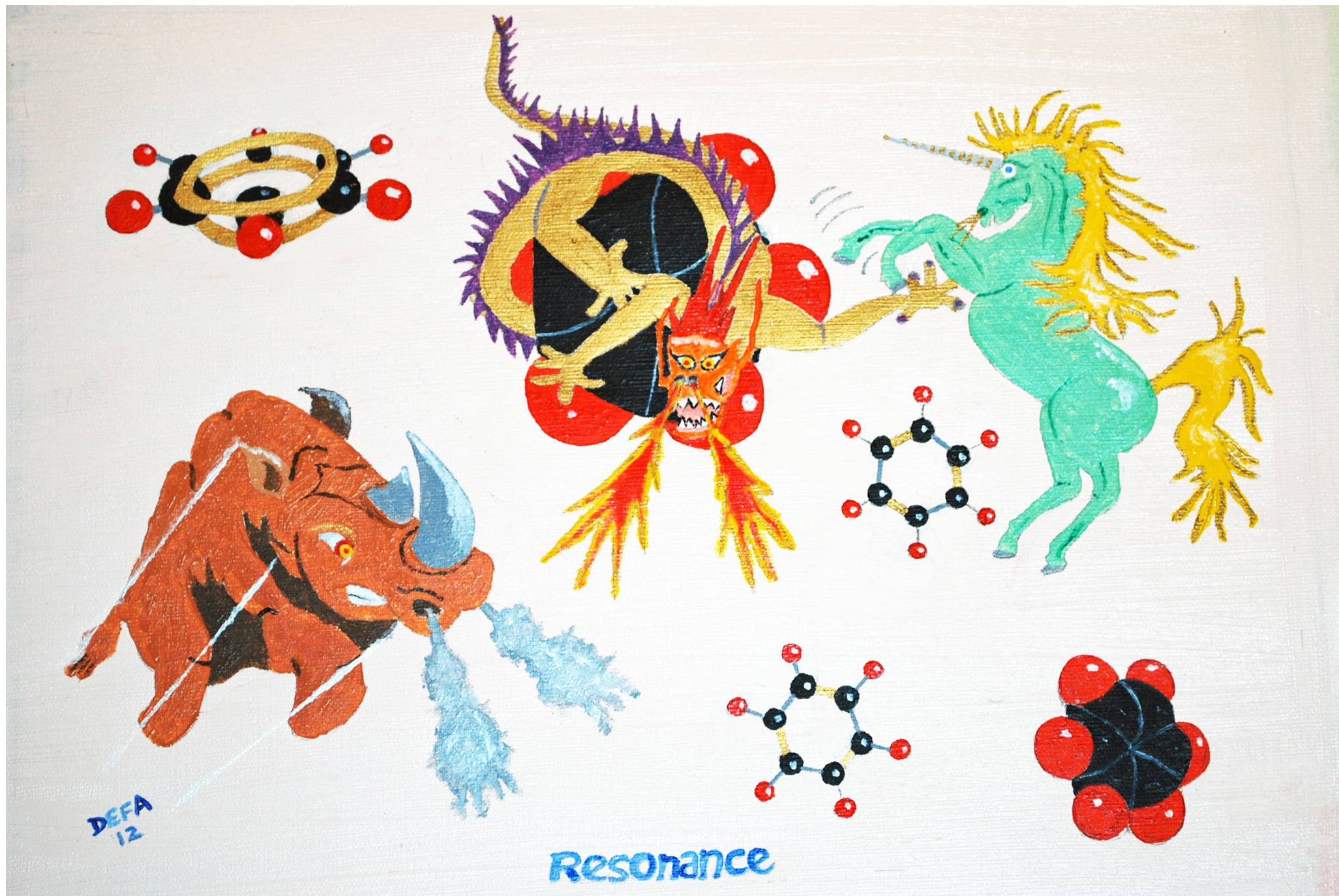
Cadmium

Technetium

Aluminium oxide (with respect to the  
oxygen atoms)

Silicon carbide





Refer to: Part III (p129)